the sharp spines of the sprat are distinctly felt, whereas the pilchard and the herring both feel comparatively smooth. To distinguish between young pilchards and young herrings, especially after they have been preserved in oil, is a more difficult matter, the size of the scales, which are relatively much larger in the pilchard, being the best guide.

PROF. A. LAWRENCE ROTCH.

PROF. ABBOTT LAWRENCE ROTCH, whose death we recorded with regret last week, was born on June 6, 1861. He received his education at the Massachusetts Institute of Technology, whence he graduated in the department of mechanical engineering in 1884. He became interested in meteorological investigation, and in 1885 founded a meteorological observatory at Blue Hill, Massachusetts, at a height of 635 feet above sea-level, for the purposes of observation, research, and local prediction. He showed characteristic independence in refusing at the outset to accept official help in maintaining the observatory at the expense of fettering it with official control. His main work was done in connection with this observatory, which he maintained and directed throughout. The results obtained were published from time to time in separate parts of the Annals of the Astronomical Observatory of Harvard College. For the first ten years the work consisted principally of the routine of an ordinary first-order observatory with reduction and analysis of the records, and special investigations of certain problems.

In 1894 the exploration of the free atmosphere by means of kites was begun at the observatory, and continued through succeeding years, steel piano wire (first used by E. D. Archibald in the early 'eighties) and a winding gear driven by a steam engine being adopted as the work developed, until a complete series of records up to a height of three miles had been obtained. In this work Rotch was a pioneer, and his methods were adopted at a later date in this country and on the Continent and by the United States Weather Bureau at the Mount Weather Observatory. In 1904 and the three following years seventy-six balloons carrying self-recording instruments were sent up under his direction at St. Louis, and of these seventy-two were recovered. Some of these reached heights exceeding ten miles, and temperatures below -70° C. were recorded. Our knowledge of the higher parts of the free atmosphere in the United States is almost entirely due to the results obtained in this series of ascents.

But Rotch's efforts were by no means confined to his own country. He was a constant visitor to meteorological meetings in Europe, and he was ever alert and ready to help in meteorological enterprise. With M. L. Teisserenc de Bort he fitted out expeditions in three successive years to explore the atmosphere over the tropical Atlantic, and the results obtained have exceeded in interest nearly all other contributions to meteorological discovery in recent years. Our knowledge of the variation of the height of the stratosphere with latitude rests almost entirely on the evidence obtained in these expeditions. His most recent work was an atlas of charts of the atmosphere for aeronauts and aviators, in which he included a chart showing the best aerial routes in summer for a dirigible balloon travelling across the Atlantic between Europe and America.

The importance of his work was recognised by scientific societies both in Europe and America, and the Governments of France and Germany conferred honours upon him.

He was generous in his recognition of the work of others, and gave kindly encouragement to younger men engaged in research. His death, which occurred suddenly on April 7, 1912, at his Observatory at Blue Hill, will be regretted by meteorologists of all lands.

E. G.

NOTES.

We are informed that the provisional programme of arrangements for the forthcoming celebration of the 250th anniversary of the Royal Society are as follows:—Monday, July 15—An evening reception of delegates at the rooms of the Royal Society. Tuesday, July 16—In the morning a commemorative service in Westminster Abbey; in the afternoon the official reception of delegates at the Royal Society and presentation of addresses; in the evening a commemorative dinner at the Guildhall. Wednesday, July 17—In the morning visits to places of interest in London; in the afternoon the Duke of Northumberland gives a garden-party at Sion House; in the evening a conversazione in the rooms of the Royal Society. Thursday, July 18—In the morning visits to places of interest in London; in the afternoon H.M. the King gives a garden-party at Windsor, to which the delegates and fellows of the society will be invited. Friday, July 19—The delegates will visit Oxford and Cambridge Universities.

In *The Times* of April 17, and in *The Morning Post* of the following day, reference is made to the drift of a sealed bottle which was thrown overboard from the steamship *Indraghira* on November 17, 1908, in lat. 51° 38′ S., long. 96° 15′ E., by a passenger during a voyage from London to Melbourne. The bottle contained a note of the ship's position with a request that the finder would notify the sender, Mr. H. P. Adams, of Carshalton, Surrey, of the facts of the discovery. The bottle was picked up early last winter, it is thought, on the eastern coast of Wellington Island, south of Chili, in lat. 49° 42′ S., long. 74° 25′ W., having drifted eastward a distance of at least 7100 nautical miles, presumably in 1100 days or less, at a minimum rate of six miles per day. This drift, though remarkable, is by no means the longest on record. The late Mr. H. C. Russell, when Government astronomer at Sydney, contributed several papers to the Royal Society of New South Wales on "Current Papers," in which he recorded the drift of numerous bottle messages, ranging from 50 to 5000 nautical miles, and several from 8000 to more than 9800 miles. The ostensible reason for launching these bottles is to gain knowledge relating to ocean currents. It is difficult, however, and generally impossible, to obtain trustworthy information in this connection from the drift of bottles, because when a bottle is sufficiently weighted to present little surface to the wind, it sinks when covered with barnacles, and if not so weighted is influenced by winds as much as or more than by currents. Moreover, it is the resultant drift during a period of unknown length, not the direction and velocity of the various currents a bottle encounters, that can be estimated. Bottle messages might, however, be utilised with advantage to shipping were the drifts charted of even half those that have been recovered—their name is legion. Such charts would be useful for tracing the probable tracks of disabled steamers and thus locating them.

Mr. R. N. Lyne, director of agriculture in Portuguese East Africa, has been appointed the director of the new agricultural department of Ceylon.

The following have been nominated president and vice-presidents of the Institution of Electrical Engineers:—*President*, Mr. W. Duddell, F.R.S.; *vice-presidents*, Mr. W. Judd, Mr. C. H. Merz, Major W. A. J. O'Meara, C.M.G., and Mr. J. F. C. Snell.

An official announcement from Mr. C. E. Adams, Government astronomer for New Zealand, states that the adopted position of the transit instrument at the Hector Observatory, Wellington, is latitude 41° 17′ 3·76″ south, longitude 11h. 39m. 4·27s. east of Greenwich; height above 1909 mean sea-level, 418 ft.

Mr. Gustav Pollak, who is preparing a biography of Michael Heilprin and his sons, will be glad to receive any letters by the late Prof. Angelo Heilprin. They may be sent to Mr. Pollak at No. 21 West Eighty-fifth Street, New York, and will be returned to the senders promptly if required.

Reuter's Agency has received the first letters which have reached this country from Dr. Mawson's Australian Antarctic Expedition. It is stated that, although in the earliest stages of its work, the expedition has disproved the existence of Clairie Land, confirmed the existence of Termination Land, discovered by Wilkes, but not seen either by the *Challenger* or the *Gauss*, discovered numerous islets along the Great Barrier, and charted a great deal of previously unknown coast-line.

The death is reported, at the age of fifty-one, of Dr. Perry L. Hobbs, professor of chemistry at the Western Reserve University, Cleveland, Ohio. He was one of the first men in America to specialise as a chemical engineer, and was widely known through his experiments in the manufacture of concrete.

Mr. E. C. Hawkins, the chief engineer of the Morgan-Guggenheim properties in Alaska, has died in the New York Hospital after an operation. In his construction of the White Pass and Yukon and the Copper River and Northern railways he met and overcame several problems of engineering that were new to the profession. In building the Childs Glacier bridge across the Copper River, for example, he had to evade the Miles glacier on one hand and the Childs glacier on the other. Mr. Williams was born in 1860, and was educated at the Rensselaer Institute, Troy, New York State.

On Tuesday next, April 30, Mr. F. Balfour Browne will begin a course of two lectures at the Royal Institution on "Insect Distribution, with Special Reference to the British Islands," and on Thursday, May 2, Prof. J. Norman Collie will give the first of two lectures on "Recent Explorations in the Canadian Rocky Mountains." The Friday evening discourse on May 3 will be delivered by Mr. W. C. Dampier Whetham on "The Use of Pedigrees," and on May 10 by Prof. W. Stirling on "The Gaumont Speaking Kinematograph Films" (illustrated by the aid of M. Gaumont).

The Home Secretary has appointed a committee to inquire and report whether the following diseases can properly be added to those enumerated in the third schedule of the Workmen's Compensation Act, 1906, namely—(1) cowpox; (2) Dupuytren's contraction; (3) clonic spasm of the eyelids, apart from nystagmus. The following are the members of the committee:—Mr. Ellis J. Griffith, K.C., M.P., Sir T. Clifford Allbutt, K.C.B., F.R.S., his Honour Judge A. Ruegg, K.C., and Dr. T. M. Legge. The secretary of the committee is Mr. Alexander Maxwell, of the Home Office, to whom all correspondence on the subject of the inquiry should be addressed.

In *The Times* of April 22 appears a description by a correspondent of the archæological work of the Egyptian Research Account, directed by Prof. Petrie, during the past season. From this it appears that Prof. Petrie and his coadjutors have made very interesting discoveries of antiquities of the time of King Narmer, of the First Dynasty, which show that the crocodile worship in the Fayyûm was already established in his time. These finds were made in a necropolis at Kafr Ammar, in Middle Egypt. "Surprising discoveries" were made also at Heliopolis, where excavation has not hitherto met with any success whatever. These are to be described later. At Memphis an alabaster sphinx weighing 80 tons has been found.

The Manchester Oriental Society was recently started by that well-known scholar Prof. Hope W. Hogg, whose premature death was a serious loss to science and a subject of general regret. The first part of the Proceedings of the society, prepared under his supervision, has just appeared. The most interesting contribution takes the shape of a symposium of well-known scholars with the object of solving a problem suggested by Prof. Elliot Smith. In examining Egyptian mummies, he noticed that it was a general habit to leave the heart *in situ*, while this was not apparently the case with other internal organs. The psychological explanation of this differentiation of treatment is still uncertain, though it is suggested by Prof. Rhys Davids, on evidence from India, that the heart was regarded as the seat of the soul. Prof. J. G. Frazer remarks that among savage races little attention seems to be paid to the kidneys, save among some of the Australian tribes, and further evidence on this point from observers of savage life is much to be desired.

In the third part of the Journal of the Gypsy Lore Society for the current year Miss E. Lyster gives an interesting account of the custom of marriage over the broomstick which prevails among some branches of the tribe in this country and other parts of Europe. The editor suggests that as in many places the besom is supposed to be an efficient instrument for scaring ghosts from the house, the stepping over it is probably a method of getting rid of their undesirable attentions. Others, again, are inclined to believe that, being specially used by women, its employment at marriage points to a stage of belief when mother-right was in force. Others suggest that the object of the bride stepping over it at marriage is to promote her fertility by associating her with the productive spirit of the tree from the branches of which it is made. Prof. Frazer in the second part of the new edition of "The Golden Bough" describes the belief that harm is done to a person or thing by stepping over him or it. This, however, seems to depend on a train of thought different from that on which the Gypsy custom rests, and the exact explanation of the latter is still obscure.

We have been favoured with a copy of the first part of an illustrated account, in Spanish, of the "microfauna," that is to say, the fresh-water plankton fauna, of the Argentine Republic, by Dr. J. M. de la Rua, published under the auspices of the National University of Buenos Aires by J. H. Kidd and Co. of that city. This part is devoted to protozoans.

One remarkable result of the collecting cruise of the *Siboga* in the Indo-Malay Archipelago was the extraordinary number of new forms of free crinoids discovered. These were handed over to Mr. A. H. Clark, of the museum at Washington, by whom no fewer than twenty new species—one of which is referred to a new genus—belonging to the families Antedonidæ and Atelecrinidæ are described in vol. xxxiv., No. 2, of Notes from the Leyden Museum.

Articles on the proposed new library and art gallery at Manchester, and the London Museum in Kensington Palace, form the leading features of the April number of *The Museums Journal*. From the former it appears that the original intention was to erect the new building on the site of the old infirmary in Piccadilly, Manchester, and the article contains reproductions of the designs which have been accepted on that understanding. An alternative site has, however, been suggested, which would seem to require a building of a different type; and until the question of site is definitely decided, no further progress in the matter can be made. The estimated cost of the building approved for the Piccadilly site is 250,000*l.*

Bulletin No. 91 of the U.S. Bureau of Entomology (U.S. Department of Agriculture) contains a detailed account by Messrs. L. O. Howard and W. F. Fiske of the attempts made to check the increase of the gipsy moth (*Porthetria dispar*) and the brown-tail moth (*Euproctis chrysorrhoea*) by importation into the United States of their parasites and natural enemies from Europe. The task was much more arduous than was anticipated at the beginning, and a great deal of original research upon the enemies of the two moths had to be undertaken in order to deal with the problem intelligently. It was found that the rapid dispersion of the introduced species necessitated the liberation of larger and stronger colonies than had been contemplated. It is hoped, however, that an efficient and automatic control of the gipsy moth in the United States will be obtained by 1916. The report is fully illustrated, and is a valuable contribution to the bionomics of insects as well as an object-lesson in methods of dealing with a serious economic problem.

In 1895 Prof. Milne published his great catalogue of 8331 earthquakes recorded in Japan during the years 1885–92, the analysis of which has thrown considerable light on the distribution of earthquakes both in space and time. He has now further increased the debt of seismologists to him by compiling, at the cost of several years' labour, a "Catalogue of Destructive Earthquakes from A.D. 7 to A.D. 1899," a memoir of nearly a hundred pages issued under the auspices of the Seismological Committee of the British Association. Though containing only half as many entries as the earlier volume, its value, it may be anticipated, will be even greater. Being confined to shocks of an intensity sufficient to damage buildings, it deals with those movements which are of chief consequence in the moulding of the earth's crust. An analysis of the catalogue for different epochs should reveal to us some of the laws which govern the distribution of seismic energy within extensive regions, such, for instance, as the Pacific coast of the American continent.

Herr Fritz Klute contributes to the *Berichte der naturforschender Gesellschaft* (Freiberg in Breisgau, Band xix., Heft i., 1911) a paper on "Die Schneereste der Schwarzwalder im Frühsommer und die Beziehungen ihrer Lage zu den Stellen ehemaliger Vergletscherung." After the heavy snows which fell on the Schwarzwald during the winter of 1906–7, it occurred to Prof. L. Neumann to send round inquiries as to the times and places where it lingered longest. These brought him 182 forms duly filled up, which he placed in Herr Klute's hands to work out. He obtained others for the winter of 1910, which brought the number up to 230. In this paper he gives a sketch of the geology and physical structure of the Schwarzwald, with a separate discussion of each district in which observations were taken. The duration of the snow depends chiefly on height and meteorological conditions (sunshine, warm winds, and rain being favourable to removal), and a useful map shows the contour lines, stations, and traces of former glaciers in the southern Schwarzwald. Here, out of 128 places of observation, only 21 have no connection with these traces; in the central region as many as 49 out of 62, and in the northern 14 out of 40. In the last the snowfall appears to be heavier than in the first at the same elevation. The results, however, do not at present lead to any definite conclusion, which, indeed, was hardly to be expected, but they were worth undertaking, and it is to be hoped they will be continued, for they may enable more precise estimates to be made of the change of temperature that would bring back an ice age, and the meteorological conditions most favourable to it. The small glaciers in the Alps tell us the conditions under which they can exist at the present day, so that we may infer from the relics of similar glaciers in the Jura, Schwarzwald, and similar ranges that like conditions prevailed in them during the Ice age.

The Italian Ministry of Foreign Affairs has issued a useful report on the climatology of Tripoli and Benghazi, prepared at the Central Meteorological Office by Dr. Eredia, with an interesting preface by Prof. Palazzo. Some of the observations used have already been published in the Annals of the French and Italian Meteorological Offices and other publications, but the recent occupation of those parts by Italy has made it desirable to issue a separate publication, brought, so far as practicable, up to date. All the principal meteorological elements are dealt with in considerable detail; we have extracted the following notes:—*Tripoli* (July, 1892, to May, 1911): Mean temperature, January, 12·1° C.; July, 25·8°; year, 19·7°; absolute maximum, 43·0°, in June and September; minimum, 1·4°, in January. Mean annual rainfall, 420·4 mm.; wettest month, December, 113·7 mm.; driest, July, 0·5 mm. Average number of rain-days, 51·1. *Benghazi* (January, 1891, to May, 1905): Mean temperature, January, 13·2°; July, 25·6°; year, 20·3°. From another series (August, 1886, to February, 1891) the absolute maximum was 40·0°, in June; minimum, 6·6°, in February. Rainfall (1886–1905): year, 276·3 mm.; wettest month, 77·4 mm., in January; driest, 0·0, in August. The rain-days were 55·1 in the yearly average. June–August were practically rainless.

In *The Times* of April 16, and in *Symons's Meteorological Magazine* for April, Dr. H. R. Mill discusses the rainfall of the winter six months, October, 1911–March, 1912, in the British Isles. In this period the excessive rainfall was as remarkable as the drought of the summer of 1911. He shows in a very interesting manner, by selecting representative stations from the mass of materials at his disposal, that although as a whole excessive, the distribution of the rainfall was very irregular, and he remarks:—"It is very common, perhaps we might say usual, to find the rainfall at the opposite ends of Great Britain swinging to opposite sides of the average and the same divergence is also apparent in Ireland." The rainfall was below the average in Scotland, north and west of the Great Glen, but above the average everywhere else. In the eastern mountain mass between Perthshire and Aberdeenshire the excess was 40 per cent. and upwards. Most of South Wales and the south of England had an excess of more than 50 per cent., and Sussex 70 per cent. and upwards. In the extreme north-west of Ireland the excess was less than 10 per cent., while in the south-east a considerable area had an excess of more than 50 per cent. Expressed in percentages of the average, England and Wales as a whole had a mean of 141, Scotland 111, Ireland 136 per cent. For the Thames Valley above Teddington, an area of about 3800 square miles, the rainfall of the winter six months, 1911–12, was greater than the annual amount in seven years out of the last twenty-nine.

Many of our readers will remember that the management of the Kew Observatory (Surrey) and the Eskdalemuir Observatory (Dumfriesshire) was recently transferred to the Meteorological Committee. The meteorological and geophysical elements observed at these stations, together with those made at Valencia Observatory (Kerry), and the wind components for four representative stations are, from January, 1911, published monthly in *The Geophysical Journal*. This work forms a very useful addition to the "British Meteorological and Magnetic Yearbook." All the units employed are based on the C.G.S. system, and although these have to some extent been used in the "Weekly Weather Report" they are not necessarily obvious to ordinary observers; their meaning is, however, lucidly explained by Dr. Shaw in the preface. The following examples illustrate some of the changes from the usual notation: atmospheric pressure is expressed in "bars," one bar being approximately equivalent to the pressure of 750 mm. of mercury; temperature is given in degrees absolute measured from a zero of 273° C. below freezing point; solar radiation is expressed in "watts" per cm.^{2}, instead of the usual gram-calorie; the latter unit is equivalent to 0·07 watt.

The annual summary of the *Indian Weather Review* for 1910 contains abstracts of observations taken at a large number of stations, and special reports from the Kodaikanal and Bombay Observatories. One of the most notable features of the year observed at the former station was the rapid decrease in sun-spot activity. In 1909 the mean daily number was 3·9; in 1910 1·8. The sun's disc was free from spots on fifty-six days. In the valuable discussion of the meteorological elements the year is divided, as heretofore, into four seasons: cold and hot weather, south-west monsoon and retreating south-west monsoon periods, while the rainfall is illustrated by maps for each of the four periods. On the whole, 1910 was the coldest year on record since 1894. Only February and May had an excess of temperature. April, November, and December were much colder than usual. On the general average of all stations in the plains, 1910 had the heaviest rainfall since the above date, notwithstanding that the winter and spring seasons were drier than usual.

The remarkably fine weather recently has had decided effects upon plant and animal life. A correspondent states that he saw a cabbage butterfly, *Papilio brassicae*, flying in his garden in the Hampstead Garden Suburb on Wednesday, April 17, and on April 21 several were seen in the course of an hour. The earliest date given by Gilbert White is April 28. Cabbage whites were seen at Appledram, near Chichester, on April 13, and the cuckoo was heard for several minutes about 5 p.m. of the same day. White's earliest date for the cuckoo is April 7. The first Sulphur butterfly and a Peacock butterfly were seen at the same place on April 6. As is well known, the brimstone or sulphur butterfly is one of the earliest to make its appearance, and may sometimes be seen on a fine day in winter months; while Peacock butterflies which have hibernated are not infrequently seen in early spring.

There exists in France a technical committee the object of which is to study and extend the knowledge of the means of prevention and of extinction of fire, and of averting accidents. It is a voluntary organisation supported by public bodies, and includes amongst its members many well-known French officials. We have received from the committee two bulletins, one relating to the precautions to be taken against fire and accidents at exhibitions, the other to precautions against fire in villages. Both documents bear evidence of the thoroughness of the work done by the committee, and can be obtained for a few pence. We notice that in neither case does the committee advise the provision of "extinguishers" or "grenades," but insists on simple buckets of water. The headquarters of the committee are at 45 Avenue Trudaine, Paris.

The magnetic survey of Egypt, commenced in 1908, has been completed, and the results obtained at eighty-one stations are summarised in a pamphlet issued by the Survey Department. The field work has been carried out by Messrs. H. E. Hurst and C. B. Middleton with instruments standardised at the Helwân Observatory. In the delta the declination varies from 3° west in the west to 2° 30′ west in the east, the dip from 43° in the north to 40° 30′ in the south, and the horizontal intensity from 0·294 in the north to 0·302 in the south. In Upper Egypt the limits are nearly the same for the declination, but the dip decreases to 30° 36′ and the horizontal intensity increases to 0·325 in the south. In Nubia the declination is 4° in the west and 2° 42′ in the east; the dip decreases to 26° 32′ at Wadi Halfa, where the horizontal intensity is 0·328. Values for the western desert are also given, and when the present survey of the Sudan is completed a full report covering the whole country is to be issued.

Mr. Stephen Paget, secretary of the Research Defence Association, has written a book summarising in ten chapters the evidence given before the Royal Commission on Vivisection, as well as the Inspector's Report for 1910, and giving in a final chapter a brief account of the commission's report. The volume will be published by Mr. H. K. Lewis.

Messrs. Witherby and Co. will shortly publish "A Hand-list of British Birds," giving a detailed account of the distribution of each bird in the British Isles and a general account of its range abroad, together with details of the occurrences of rarities. The hand-list is the joint work of Messrs. E. Hartert, F. C. R. Jourdain, N. F. Ticehurst, and H. F. Witherby.

Messrs. Jack announce that among the volumes to be included in the second dozen of "The People's Books," which are to be issued on May 15, will be "The Foundations of Science," by Mr. W. C. D. Whetham, F.R.S.; "Inorganic Chemistry," by Prof. E. C. C. Baly, F.R.S.; "Radiation," by Dr. P. Phillips; "Lord Kelvin," by Dr. A. Russell; "Huxley," by Prof. G. Leighton; and "Francis Bacon," by Prof. A. R. Skemp.

OUR ASTRONOMICAL COLUMN.

Cometary Statistics.—Some interesting figures concerning comets have been educed by M. Borrelly, and appear in Nos. 51–52 of the *Gazette Astronomique.* For 376 comets discovered since the sixteenth century he gives the place of discovery, Marseilles heading the list with 64, Paris coming second with 46, and Geneva, Florence, Lick, Nice, and Berlin following with 16, 15, 14, 12, and 12 respectively. It is noteworthy that of British observatories, Slough is top with seven discoveries, and Bristol, twenty-second in the complete list, has four to its credit. Nearly two-thirds of the comets discussed were discovered in the morning before sunrise, and the second half of the year has proved more prolific in cometary discoveries than the first. Of these 376 comets, 106 were periodic and 19 have been observed at more than one return; only 56 have been visible to the naked eye, and seven could be seen during full daylight.

The Best Value of the Solar Constant.—In the current number of the *Astrophysical Journal* (vol. xxxv., No. 2, March) Messrs. Abbot and Fowle traverse Prof. Very's criticism of their determination of the solar constant noted in this column on January 18. Among other things they deprecate the deduction of a value for the constant from such unknown and fragmentary data as the reflection and emission of the earth, the moon, and Mars, the temperatures of the two latter, and the dependence of terrestrial temperature on insolation. They maintain that many other variables beside the insolation, *e.g.* cloudiness, distribution of land and water, mountains, &c., considerably complicate terrestrial temperatures, and show that they have not departed from Langley's methods except in so far as they are improved by thirty years' extra experience.

Observations of Saturn and its Rings.—To No. 4566 of the *Astronomische Nachrichten* Dr. H. E. Lau contributes a note describing his observations of Saturn, with the 10-inch refractor of the Urania Observatory, during the years 1908–1910. He found the colour of the south pole to be bluish-green changing to a brownish-green at a little distance from the actual polar region. For the various rifts he records various shades of colour and also places on record the appearance of whitish cloud masses in the equatorial zones in December, 1909, and September, 1910. Measures of the rings on seven evenings in 1909 and 1910 gave 40·03″ for the outer diameter of the A ring, 34·59″ for the Cassini division, 26·48″ for the inner diameter of the B ring, and 21·34″ for the inner diameter of the C ring; the breadth of the Cassini division was found to be 0·71″. Differences of colour between the different parts of the various rings are also recorded.

The Cañon Diablo Crater.—An interesting paper by Mr. Elihu Thomson appears in No. 19, vol. xlvii., of the Proceedings of the American Academy of Arts and Sciences, in which the author, having visited the famous Coon Butte or "Meteor Crater," speculates as to the probability of the crater having been produced by the impact of an enormous meteor. He states that the amount of rock blown out of the cavity could not have been less than two or three